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QUALITY ASSURANCE PROGRAM PLAN FOR THE AUTOMATED SURFACE WATER MONITORING PROGRAM

Rocky Mountain Remediation Services, L.L.C.

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QUALITY ASSURANCE PROGRAM PLAN
FOR
THE AUTOMATED SURFACE WATER MONITORING PROGRAM

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ACRONYMS AND ABBREVIATIONS

ADPE	Automated Data Processing Equipment
Ag	Silver
Am	Americium
ASD	Analytical Services Division
Be	Beryllium
°C	Degrees Celsius
CASI	Commodore Advanced Sciences, Incorporated
Cd	Cadmium
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
Cr	Chromium
CLP	Contract Laboratory Program
BZ	Buffer Zone
DOE	U S Department of Energy
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EPA	U S Environmental Protection Agency
FY	Fiscal Year
H&S	Health and Safety
IA	Industrial Area
IMP	Integrated Monitoring Plan
K-H	Kaiser-Hill Company, L L C
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate
M&TE	Maintenance and Testing Equipment
MS/MSD	Matrix Spike/Matrix Spike Duplicate
Pu	Plutonium
POC	Point of Compliance
POE	Point of Evaluation
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Program Plan
RDLs	Required Detection Limits
RFCA	Rocky Flats Cleanup Agreement
RFFO	Rocky Flats Field Office
RIN	Report Identification Number
RMRS	Rocky Mountain Remediation Services, L L C
RPD	Relative Percent Difference
SOW	Statement of Work
Site	Rocky Flats Environmental Technology Site
SW	Surface Water
SWD	Soil and Water Database
TSS	Total Suspended Solids
TPU	Total Propagated Uncertainty
U	Uranium
V&V	Verification and Validation

1 0 PROGRAM MANAGEMENT

This Quality Assurance Program Plan (QAPP) supports the *Automated Surface-Water Monitoring Program Work Plan* (RMRS, 1999a) for implementation of the *Rocky Flats Cleanup Agreement* (RFCA, 1996) at the Rocky Flats Environmental Technology Site (Site) in accordance with the Fiscal Year (FY) FY00 *Integrated Monitoring Plan* (IMP)(Kaiser-Hill, 1999a) and the FY00 *IMP Background Document* (Kaiser-Hill, 1999b) This QAPP was prepared in accordance with EPA QA/R-5 *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*, (EPA, 1997) and to the requirements of DOE Order 414 1, *Quality Assurance* Table 1 provides a crosswalk between the elements of the QAPP defined in QA/R-5 and the ten criteria established in DOE Order 414 1 This QAPP is structured in accordance with EPA's QA/R-5 guidance for preparing QAPPs This section covers the area of program management, including the project organization, background and purpose, program description, quality objectives and criteria, training, and documentation and records

1.1 Program Organization

Organization and responsibilities specific to the RFCA Automated Surface-Water Monitoring Program are discussed in this section The Site is owned by the U S Department of Energy (DOE), managed by the DOE Rocky Flats Field Office (DOE RFFO) and operated by Kaiser-Hill Company, L L C (K-H) The RFCA Automated Surface-Water Monitoring Program is developed, implemented, and managed by Rocky Mountain Remediation Services, L L C (RMRS) Water Operations/Surface Water (SW) under contract to Kaiser-Hill An RMRS Surface Water organization chart is provided as Figure 1 RMRS, under subcontract to K-H, provides the managerial and technical staff to perform program planning, implementation, equipment installation, operation and maintenance of the sampling equipment and sample collection for the automated surface water-monitoring program Commodore Advanced Sciences, Inc (CASI), a subcontractor to Kaiser-Hill Analytical Services Division (ASD), also provides technical support for the RFCA automated surface water monitoring tasks CASI provides support for sample receiving, preparation, shipping, and tracking RMRS SW personnel collect the composite surface-water samples from the field and deliver them to CASI for splitting, preservation, and shipment to the appropriate laboratories for the required analyses Analytical services are provided by subcontractor laboratories, approved by K-H ASD

1.1 1 Management Organization

Organization and responsibilities specific to the Automated Surface-Water Monitoring Program are discussed below

The Facility Manager for Surface Water, is responsible for the overall management and coordination of the following activities

- Surface Water program/project coordination
- Group management and organizational administration
- Evaluation and ensuring adequacy of work and health and safety (H&S) controls
- Integration of SW requirements with Site operations and projects
- Programmatic guidance, budgeting, and work scope integration
- SW program/project tracking and reporting
- Technical services (as required)

The Surface Water Monitoring Program Manager, is responsible for the following

- Surface Water Monitoring program lead
- Planning and budgeting for the SW monitoring and reporting program
- Contract Technical Representative for monitoring subcontracts
- Environmental data retrievals (Soil and Water Database), assessment, and reporting
- Surface Water computer system and network management
- Integrated Monitoring Plan development and annual updates
- Procedure and work control preparation and administration
- Coordination of Surface Water QA program

The Automated Monitoring Project Manager is responsible for the following

- Technical project manager for automated surface water monitoring systems
- Surface water monitoring for RFCA, Industrial Area Interim Measure/Interim Remedial Action (IM/IRA), and stormwater
- Remote monitoring systems/gauging stations installation and maintenance
- Special Projects, water quality and hydrologic reports (e g , site-wide water balance, ITS Diversion, RFCA)
- General site hydrologic and water quality analysis and technical support

The Program Environmental Engineer is responsible for

- Coordinating and maintaining the automated surface-water monitoring field activities in support of the IMP (including that for RFCA and Industrial Area IM/IRA)
- Maintain and calibrate the water quality probes for continuous and real-time data collection
- Prepare studies including water balances, depletion estimates and discharge summaries
- Prepare technical analyses and reports
- Integrated surface water monitoring/DQO development
- Source evaluation data analysis and report preparation

- General Site hydrologic and water quality analysis

The Field Engineer is responsible for

- Operation and maintenance of remote monitoring and sampling equipment including flow control structures, flow meters, and samplers
- Record keeping (field logs and electronic logs) for all routine activity
- Compiling Buffer Zone analytical data and metals data from selected stations
- Assist with procedure and work instruction development

The Sampling Coordinator is responsible for the following

- Oversight of environmental monitoring and analytical data collection
- Analytical Services Division liaison
- RMRS liaison for K-H, ASD for sampling and shipping subcontractor (CASI)
- State exchange meeting coordinator
- Surface water issues management
- Water operations support

The Monitoring Network Specialist is responsible for

- Updating and maintaining remote monitoring network system
- Computer systems troubleshooting/maintenance
- CIS and electrical engineering support (freeze protection and instrumentation)
- Telemetry system maintenance and programming

The roles and responsibilities of other field team members are to assist the Automated Monitoring Project Manager with sampling activities, sample handling, and documentation

1.1 2 Quality Assurance Organization

The RMRS QA Manager is independent of the technical staff and reports directly to the President of RMRS on QA matters The QA Manager has the authority to objectively review projects and identify problems, and the authority to use corporate resources as necessary to resolve any quality-related problems

The QA Manager, and the QA Engineer for the surface water program report directly to the RMRS QA Manager on QA matters They are matrixed to the organizations that they support and are responsible for the following

- Reviewing and approving the project-specific plans
- Directing the overall surface water QA program
- Maintaining QA oversight of the surface water program

- Reviewing QA sections in program reports as applicable
- Reviewing QA/QC procedures applicable to this program
- Auditing selected activities of this program performed by RMRS
- Initiating, reviewing, and following up on response actions, as necessary
- Promoting QA/QC awareness of surface-water monitoring objectives
- Consulting with the RMRS QA Manager, as needed, on appropriate QA/QC measures and corrective actions
- Conducting internal system surveillances to check on the use of appropriate QA/QC measures
- Arranging performance surveillances of measurement activities, as necessary with respect to goals and objectives

1.1.3 Plan Organization

Section (Section 1 0) presents project management and introductory information Section 2 0 provides guidance for measurement and data acquisition Section 3 0 details assessment and oversight aspects of the project, and Section 4 0 describes data validation and usability issues References for the entire QAPP are listed in Section 5 0

1.2 Background and Purpose

The Site is a government-owned, contractor-operated facility that was part of the DOE nuclear weapons complex, located in Golden, Colorado The Automated Surface-Water Monitoring Program is implemented at multiple locations throughout the Site The Site land area is functionally divided into two regions the Industrial Area (IA, industrial area inside the inner fence) and the Buffer Zone (BZ, the open space surrounding the IA, but within the DOE property line) Figure 2 shows the locations of the automated surface-water monitoring locations Each surface water monitoring location is equipped with automated environmental instrumentation capable of satisfying the location-specific data acquisition requirements as specified in the *Work Plan* (RMRS, 1999a) Precipitation data is also collected at additional locations as shown on Figure 2

The purpose of this QAPP is to establish management controls and provide guidance to ensure that all collection procedures for environmental data and measurements are accurate, acceptable, and documented in accordance with the requirements of the program

The IMP provides a framework for monitoring in support of transition activities at the Site This framework includes implementation of an automated surface-water monitoring program that supports data-driven decisions determined by the IMP Data Quality Objectives (DQO) process The ten monitoring objectives to be accomplished though the Automated Surface Water Program are described below

Site-Wide Monitoring Objectives:

- Imminent Danger to Life and Health (IDLH) Decision Monitoring – Monitoring of multiple parameters for the safe and effective operation of the Site detention ponds
- Source Location Monitoring – Monitoring of flows and contaminant levels in subdrainages to allow for the location of contaminant sources
- Ad Hoc Monitoring – Monitoring of various surface-water parameters at various locations on an Ad Hoc basis
- Monitoring for Correlation of Plutonium with TSS – Monitoring of plutonium (Pu) and total suspended solids (TSS) values at various locations to determine a correlation between Pu and TSS

Industrial Area Monitoring Objectives:

- Performance Monitoring – Detection of a release of contaminants from specific high-risk projects within the Industrial Area (IA)

Monitoring Objectives for Industrial Area Discharges to Ponds:

- New Source Detection Monitoring – Detection of statistically significant changes of contaminants in runoff from within the IA in general
- Stream Segment 5 Point of Evaluation Monitoring – Detection of contaminants exceeding RFCA Action Levels in discharges entering Stream Segment 5 and the Site detention ponds

Monitoring Objectives for Terminal Detention Pond Discharges and Water Leaving the Site:

- Stream Segment 4 Point of Compliance Monitoring – Detection of contaminants exceeding RFCA Standards in discharges entering Stream Segment 4
- Non- Point of Compliance Monitoring at Indiana Street – Monitoring of indicator parameters in discharges leaving the Site boundary as a prudent management action

Buffer Zone Monitoring Objectives:

- Buffer Zone Hydrologic Monitoring – Monitoring of flows and water-quality in the Buffer Zone (BZ) for ecological and water rights issues, as well as supporting studies into the interaction between media

The Site surface-water automated monitoring network varies in size and currently consists of 33 monitoring stations (Figure 2) to achieve these objectives Many of these locations are configured with radio-telemetry for real-time data transmission Many locations serve multiple monitoring objectives

1.3 Project Description

The QAPP addresses field work to be performed for the Automated Surface-Water Monitoring Program Surface water sampling, sediment sampling, and analysis of media sampled are included in the Surface Water Program Other tasks discussed in the *Work Plan* (RMRS 1999a) consist of the following

- Automated surface-water sampling network design

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- Monitoring equipment operation and maintenance
- Data collection and storage
- Data reduction and tabulation
- Preparation of Quarterly RFCA Monitoring Reports
- Preparation of Point of Evaluation (POE)/Point of Compliance (POC) Source Evaluation Reports (as required)

Sampling activities and all associated procedures are described in detail in the *Automated Surface-Water Monitoring Program FY99 Work Plan* (RMRS, 1999a) (Sections 6 0 and 7 0) Laboratory analytical services are performed under Kaiser-Hill ASD contracts Analytical laboratory contract Statements of Work (SOW) are modular, so that different modules may be implemented at different laboratories Analytical procedures for radiochemical analyses are addressed in modules RC01 (isotopic determinations by alpha spectroscopy) and RC02 (tritium analysis by liquid scintillation counting) Analytical procedures for inorganic metals and water quality parameters are located in Standard Services Modules SS05 and SS06, respectively Additional information on analytical methods is provided in Sections 1 4 2 4 and 2 4

1.4 Quality Objectives and Criteria for Measurement

This section describes the control and review of data quality objectives, so that environmental measurements and data collected by RMRS are of known quality The subsections below describe the DQOs (Section 1 4 1) and data measurement objectives (Section 1 4 2)

1.4.1 Data Quality Objectives

The DQO process is a series of planning steps based on the scientific method that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose The DQO's were developed in accordance with EPA QA/G-4 *Guidance of the Data Quality Objectives Process* (EPA, 1994) DQOs are qualitative and quantitative statements derived from the outputs of each step of the DQO process that

- Clarify the study objective,
- Define the most appropriate type of data to collect,
- Determine the most appropriate conditions from which to collect the data, and
- Specify acceptable levels of decision errors that are used as the basis for establishing the quantity and quality of data needed to support the decision

The DQOs are then used to develop a scientific and resource-effective sampling strategy The DQOs for each of the surface water monitoring objectives referenced above (in Section 1 2) are presented in detail in the *FY00 Integrated Monitoring Plan Background Document* (IMP, 1999b) (Sections 2 2, 2 3, 2 4, 2 5 and 7 2) The IMP is revised annually and uses the DQO process to determine necessary and sufficient monitoring requirements The DQO process specifies project decisions, the data

quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality The process also ensures that the resources required to generate the data are justified The DQO process consists of seven steps of which the output from each step influences the choices that are made later in the process These steps are as follows

- Step 1 State the Problem(s)
- Step 2 Identify the Decision(s)
- Step 3 Identify the Inputs to the Decision (data needed to make decision)
- Step 4 Define the Boundaries of the Study
- Step 5 Develop a Decision Rule(s)
- Step 6 Specify Tolerable Limits on Decision Errors
- Step 7 Optimize the Design for Obtaining Data

1.4.2 Data Measurement Objectives

The assessment of data quality indicators is a significant factor in determining data usability The principal data quality indicators are precision, accuracy (bias), representativeness, comparability, and completeness (PARCC) Of the six principal data quality indicators, precision and bias are quantitative measures, representativeness and comparability are qualitative, completeness is a combination of both qualitative and quantitative measures, and accuracy is a combination of precision and bias

Every reasonable attempt is made to obtain a complete set of usable field measurements and analytical data If a measurement cannot be obtained, or is unusable for any reason, the effect of the missing or invalid data are evaluated In order to determine data usability, PARCC parameters are evaluated as described in Section 1 4 2 2

1.4.2.1 Quality Assurance Guidance

The Automated Surface Water Monitoring QA program has been designed in accordance with the RMRS *Quality Assurance Program Description* (QAPD) (RMRS, 1999b) EPA's *Guidance for the Data Quality Objectives Process* (EPA 1994), and QA/R-5 *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA 1997)

1.4.2.2 Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity Parameters

PARCC parameters are indicators of data quality Analytical data that are collected in support of the Automated Surface Water Monitoring Program are evaluated using the guidance developed in RMRS procedure RF/RMRS-98-200, *Evaluation of Data for Usability in Final Reports* This procedure establishes the guidelines for evaluating analytical data with respect to the PARCC parameters The following paragraphs define these PARCC parameters in conjunction with this program

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Precision The precision of a measurement is an expression of mutual agreement among duplicate measurements of the same property taken under prescribed similar conditions Precision is a measure of the reproducibility of results and is evaluated by comparing results from field duplicate samples with results from associated real samples Precision is evaluated quantitatively by using two functions The most typical measure for non-radiological analyses is the relative percent difference (RPD) term, whereas, because of the stochastic nature of radioactivity, a statistical measure is better suited for evaluating radiological reproducibility This measure is referred to as the duplicate error ratio (DER) The equations for evaluating these two measures is provided below

$$RPD = \left[\frac{C_1 - C_2}{(C_1 + C_2)/2}\right] 100$$

C_1 = first sample result (in terms of concentration)
C_2 = duplicate sample result (in terms of concentration)

$$DER = \left[\frac{C_1 - C_2}{\sqrt{\left(TPU_{c1}^2 + TPU_{c2}^2\right)}}\right] 100$$

C_1 = first sample result (in terms of concentration)
C_2 = duplicate sample result (in terms of concentration)
TPU = total propagated uncertainty

The purpose of the field duplicate samples is to evaluate the precision of the field sampling process The acceptable RPD limits for non-radiological field duplicate measurements are ≤ 30% for soil and ≤ 40 % for water At least 85% of all quality control samples are required to comply with the established precision, or RPD goals Duplicate samples exceeding the RPD criteria indicate that samples do not comply with the DQO specifications, and require an explanation of the deficiencies The acceptable DER limit for radiological field duplicate measurements is ≤ 1 96 Duplicate samples exceeding the DER criterion are interpreted as different at the 95% confidence level

Accuracy Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system The closer the measurement to the true value, the more accurate the measurement All analytical data are compared with the required analytical method, and detection limit with the actual method used, and its detection limit for each medium and analyte to assess the DQO compliance for accuracy

Representativeness Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population parameter at a sampling point Representativeness is a qualitative term that should be evaluated to determine whether samples are collected in such a manner that the resulting data appropriately reflect the contamination present Typically the discussion of representativeness is limited to an evaluation of whether analytical results

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for field samples are truly representative of environmental concentration, or whether they may have been influenced by the introduction of contamination during collection and handling This is assessed by evaluating the results of various blanks, specifically equipment rinsates Representativeness is also accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest The actual sample types and quantities are compared with those stated in the *Work Plan* (RMRS 1999a), and organized by media type and analytical suite Deviation from the required and actual parameters will be justified

Completeness Completeness is a measure of the amount of valid usable data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions Usability is determined by evaluation of the PARCC parameters excluding completeness Those data that are validated and need no qualification, or are qualified as estimated or undetected, are considered usable Rejected data are not considered usable Completeness is calculated following data evaluation A completeness goal of 90% has been established for the Automated Surface Water Monitoring Program If this goal is not met, additional sampling may be necessary to adequately achieve project objectives Completeness is calculated using the following equation

$$Completeness = DP_u = \left[\frac{DP_t - DP_n}{DP_t}\right]100$$

Where DP_u = Percentage of usable data points
DP_n = Non usable data points
DP_t = Total number of data points

Comparability Comparability is a qualitative parameter Consistency in the acquisition, handling, and analysis of samples is necessary for comparing results Data developed under this investigation are collected and analyzed using standard EPA or nationally recognized analytical methods, and QC procedures to ensure comparability of results with other analyses performed in a similar manner Data resulting from this sampling effort may be compared to other data sets

Sensitivity Sensitivity is the achievement of method detection limits, and depends on instrument sensitivity and matrix effects Therefore, it is important to monitor the sensitivity of data-gathering instruments to ensure that data quality is met through constant instrument performance Instrument sensitivity is monitored through the analysis of blanks

1.4 2 3 Field Measurements

Water quality field measurements are recorded "real time" utilizing the YSI 6000UPG Multi-Parameter Water Quality Monitors The following water quality parameters are obtained with the YSI 6000UPG pH, temperature, specific conductivity, turbidity and nitrate Daily means for pH, conductivity, turbidity and nitrate are also obtained from the YSI 6000UPG via telemetry Water quality probes are retrieved from the field monthly for maintenance and calibration of all parameters The data obtained from the YSI Water Quality Monitors are used as indicators of changing conditions in the field, and not for demonstrating compliance, as these are non-laboratory analytical procedures

Surface water level field measurements are obtained from staff gauges located at the measurement point for the specific flow control structure Water levels obtained from the staff gauges are used as a performance check for the ISCO flow meters (Models 4220 and 4230) Under normal flow conditions the ISCO Flow Meters are adjusted if the water level obtained visually from the staff gauge varies by ± 0 005 feet from the reading on the ISCO Flow Meter

1.4.2.4 Laboratory Analysis

Analytical Services Division of Kaiser-Hill Company, L L C manages and tracks all samples collected at the Site, and coordinates analytical support requirements for all Site programs Laboratory analytical services are performed under a Kaiser-Hill ASD contract The ASD contract SOW for analytical measurements is modular, and therefore allows different laboratories to implement different modules The SOW modules specify general requirements for all labs in module GR01-B 3, *General Laboratory Requirements* The various modules apply to different types of analyses The modules requested by the Automated Surface Water Monitoring Program include, RC01-B 3, *Isotopic Determinations by Alpha Spectrometry,* RC02-B 1, *Tritium Analysis by Liquid Scintillation*, SS05-C, *Inorganic Metals* and SS06-B 3, *Water Quality Parameters* Individual and suites of parameters are specified in the line item codes found within each module All modules and guidelines are maintained by K-H ASD Analytical methods and laboratories, required detection limits, holding times, and QC analyses are discussed below

Analytical Methods

Surface water samples collected at the Site for the Automated Surface Water Monitoring Program are analyzed for total (unfiltered) radionuclides (plutonium [Pu], americium [Am], uranium [U] and tritium), metals (Contract Laboratory Program [CLP] SOW-Total), dissolved cadmium (Cd) and silver (Ag), total beryllium (Be) and chromium (Cr), and water quality parameters (hardness, total suspended solids) The analytical methods, ASD module and line item codes for these surface water analyses are presented in Table 2 References for these methods are found within each module for ASD's laboratory services contract

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Laboratories

The analytical laboratories are selected by preaward audits conducted by K-H ASD The audits assess the laboratories ability to meet the general requirements established in ASD Module GR01-B 3 and the specific requirements for the ASD SOW Modules referenced in Table 2

Several laboratories are used for the Automated Surface-Water Monitoring Program as determined by the ASD analytical sample tracking system The samples to be analyzed are sent to laboratories currently under contract to and as directed by K-H ASD

Required Detection Limits

The required detection limits (RDLs) for each analyte are provided in ASD SOW Modules referenced in Table 2

The achievement of reporting limits depends on instrument sensitivity and sample matrix effects It is critical to monitor the sensitivity of data-gathering instruments to ensure data quality through constant instrument performance checks

Holding Times

Holding times are maximum storage times allowed between sample collection and sample extraction, or analysis (depending on whether the holding time is an extraction or analytical holding time), when designated preservation and storage techniques are employed Maximum holding times areconsidered when determining the method of shipment Holding times for each analytical method for this sampling program are provided in the analytical methods referenced in each of the ASD SOW Modules

Quality Control Analyses

To provide an external check of the quality of the field procedures and subcontractor laboratory analytical data, three types of QC samples (field duplicate samples, equipment rinsate blanks, and trip blanks) are typically submitted to the laboratory Equipment rinsate blanks are collected at a rate of 5% and analyzed to check for sample cross-contamination, the quality of decontamination water, and the adequacy of the field decontamination procedure Field duplicate samples are collected at a rate of 5% to provide a check for sampling and analytical error Trip blanks will not be collected, as volatile organic compounds (VOCs) are not typically analyzed for in the Automated Surface Water Monitoring Program The total number of samples that are collected for QC analyses are specified in the *Automated Surface-Water Monitoring Program Work Plan* (RMRS 1999a)

In addition to the external QA/QC controls, internal QA procedures are maintained by the laboratory Internal QC samples will include laboratory blanks (method blanks, preparation blanks), laboratory duplicates, matrix spike/matrix spike duplicates (MS/MSDs), and laboratory control samples/

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laboratory control sample duplicates (LCS/LCSDs), as discussed in the ASD SOW Modules referenced in Table 2

1 5 Personnel Training and Qualification Requirements

RMRS and subcontractor Human Resources maintain on-the-job transcripts and resumes to document education and experience All personnel shall receive the required indoctrination and training specific to the tasks each individual is performing at the Site Site supervisors and workers shall have the minimum training requirements listed in Table 3 prior to the start of automated surface water sampling activities as defined in the Work Plan (RMRS, 1999a)

Objective evidence of staff competency and their maintenance of competency are accomplished in accordance with RMRS-TR-02 06, *Development, Use and Control of List of Qualified Individuals* Personnel records are maintained in accordance to RM-06 02, *Records Identification, Generation and Transmittal* Site-specific and project specific training records are managed by the RMRS training coordinator for the Surface Water Program

1.6 Documentation and Records

Document Control

Work controlling documents, such as work plans, and standard operating procedures, are controlled, where "control" is constituted by the following criteria

- The documents are uniquely identified for reference purposes,
- The required reviews and approvals are accomplished, and,
- The personnel, who need the documents to perform the work, receive the latest approved versions of the document(s)

Document control for distribution of electronic and hard copy records, including quality records, is performed in accordance with RMRS DC-06 01, *Document Control Program*, and RMRS-DC-05 01, *Preparation and Control of RMRS Documents* Essential policies, plans, procedures, decisions, data, and transactions of the project are documented to an appropriate level of detail The objective shall be to maximize the utility of records and data for accomplishment of performance objectives while minimizing the cost of information management and paperwork for the Program

All documents that constitute contractual deliverables (from RMRS to the client), such as work plans or final reports, shall undergo a minimum of three reviews, internally within RMRS, to ensure that minimum quality requirements are met

- A technical/peer review (as determined by management)
- A quality assurance review
- A management review (level of management higher than that of the author(s)

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The project manager will assign other technical reviewers, as applicable, to cover the technical disciplines represented within the document

Quality records, including digital data stored on computerized media, shall be managed to ensure that information is retained, retrievable, and legible Active records are maintained by project personnel, including RMRS subcontractors, in an organized and retrievable fashion, until such time that the records have served their purpose and become inactive Quality records are considered active until the final peer reviews are conducted, thus, quality records are not subject to the 30-day limit on turnover to the Records Center until final peer reviews are conducted Peer reviews of records must be conducted on records completed by the originator within two (2) weeks of completion

Quality records managed by subcontractors are acquired by RMRS through the standard processes of procurement and subcontracting Only inactive records are sent and maintained in records storage facilities Records turnover and archival are controlled through RM-06 02, *Records Identification, Generation, and Transmittal*

Quality records resulting from direct measurements or technical sampling activities shall be authenticated by the originator and subsequently authenticated by a peer reviewer not involved with the work ("QC checked") For data uploaded to computer from the quality records described above, final data entry (as portrayed on hardcopy output), must be reviewed by someone other than the data entry person, and the hardcopy must be authenticated by the reviewer, errors on quality records shall be corrected by striking through the original entry with a line, and incorporation of the correct data adjacent to the strike-out Authentication is also required for corrections

Documents and records to be placed in the CERCLA Administrative Record shall be dispositioned via RM-06 04, *Administrative Record Document Identification and Transmittal*

Kaiser-Hill Analytical Services Division is responsible for all original records produced concerning lab-generated chemistry and radiochemistry data, the Automated Surface-Water Monitoring Program will use data as provided by K-H ASD or their subcontractors These records are managed in accordance with 1-V41-RM-001, *Records Management Guidance for Records Sources*

Automated Data Processing Equipment (ADPE)

ADPE used for data reduction and analysis shall be controlled to

- Ensure traceability of changes made to original data
- Allow independent peer reviewers to relate inputs to outputs
- Reconciliation of SWD results with the ASD preliminary hard copy results will be conducted in accordance with *Review of Surface Water Monitoring Program Documents and Records* instruction (pending approval)
- RMRS digital data for the Soil Water Database (SWD) is controlled through RF/RMRS-98-203, *SWD As-Built Detailed Design*

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2.0 MEASUREMENT AND DATA ACQUISITION

This section covers requirements and procedures for sampling process design, sampling methods requirements, sample handling and custody, analytical methods, quality control, equipment maintenance, instrument calibration, supply acceptance, nondirect measurements, and data management The field procedures are designed so that the following occurs

- Samples collected are consistent with program objectives
- Samples are collected in such a manner that data represent actual site conditions

The following is a summary of the sample collection process for the automated surface water program

1 The RMRS sampling team installs and programs the automated surface-water samplers

2 RMRS sampling team collects the carboy(s) from the selected automated surface water location(s)

3 If no historical data are available at a new automated surface water sampling location, then a radiological survey/screen will be required prior to sample shipment

4 RMRS sampling team delivers the carboy(s) to CASI (Trailer T891R)

5 RMRS sampling team completes the Sample Collection Form (Figure 3) for each carboy (at T891R)

6 CASI sample team personnel prepare the sample bottles (including splitting and preservation) and the chain of custody for shipment to the appropriate analytical laboratory

7 Based on laboratory capacity and the specific analytical requirements ASD determines the receiving laboratory

8 CASI ships surface water samples to the receiving laboratory

9 The receiving laboratory provides a receipt notice to ASD

10 The data turn-around-time is requested by the Automated Surface-Water Monitoring Program

11 The analytical laboratory prepares the final data package (hard copy) and the electronic data deliverable (EDD) for delivery to ASD

12 Verification and Validation (V&V) of the final data package is performed by TechLaw, Inc for ASD as required

13 Upon completion of the V&V process ASD electronically transmits the data to the SWD for data user (surface water program) access

14 ASD retains the hard copy of the data package (quality record) until it is delivered to the Records Center at the Federal Center

2.1 SAMPLE PROCESS DESIGN

The Automated Surface Water Monitoring Program at the Site addresses the requirements of statutes, regulations, orders, and agreements, and supports many decision making processes documented in the FY00 IMP (Kaiser-Hill, 1999a) The Automated Surface-Water Monitoring Program

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(summarized in Table 1 of the FY00 IMP) groups all of the Site monitoring objectives into the following five primary areas

- Site-wide water quality
- Quality of waters within the Industrial area
- Quality of discharges from the Industrial Area
- Quality of water leaving the Site
- Off-site water quality

The number, types, locations, and analyses of samples are presented in Section 6 of the *Automated Surface-Water Monitoring Program FY99 Work Plan* (RMRS, 1999a)

2.2 Sampling Methods Requirements

Sampling equipment, containers, and overall field management are described below

2.2.1 Sampling Equipment and Preparation

The equipment required for the field program for sampling, health and safety, documentation, and decontamination is presented in Table 4 of this QAPP

Routine field preparatory activities include review of SOPs, procurement of field equipment, daily field planning meetings that at a minimum include the Environmental Engineer, and Field Engineer for surface-water sample collection (carboys only)

2.2.2 Sample Containers

Sample containers and preservatives required for the surface water samples are described in RMRS procedure RMRS/OPS-PRO 069, *Containing, Preserving, Handling, and Shipping of Soil and Water Samples*, (Table A-1) The samples are preserved in the field by CASI,, if necessary Containers and preservatives for all radiochemistry, and non-radiochemistry analyses are supplied by CASI

2.2.3 Sample Collection, Handling, and Shipment

Samples collected for the Surface-Water field program consist of surface water, sediment, and associated QC samples All sample collection procedures are outlined in the following Operations Procedures and manufacturer's instruction manuals

Operations Procedures

RMRS/OPS-PRO 063, *Action Level Response Plan for Dams A-4, B-5 or C-2*

RMRS/OPS-PRO 064, *Pond and Reservoir Bottom Sediment Sampling*

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RMRS/OPS-PRO 069, *Containerization, Preservation, Handling and Sampling of Soil and Water Samples*

RMRS/OPS-PRO 081, *Surface Water Sampling*

RMRS/OPS-PRO 083, *Industrial Effluent Discharge Sampling*

RMRS/OPS-PRO 084, *Operation and Maintenance of Stream-Gaging and Sampling Stations*

RMRS/OPS-PRO 085, *Pond Sampling*

RMRS/OPS-PRO 086, *Sediment Sampling*

RMRS/OPS-PRO 092, *Event-Related Surface Water Sampling*

RMRS/OPS-PRO 093, *Discharge Measurement*

RMRS/OPS-PRO 094, *Field Measurements of Surface Water Field Parameters*

RMRS/OPS-PRO 112, *Handling of Decontamination Water and Wash Water*

RMRS/OPS-PRO 126, *Surface Water Data Collection Activities*

4-S01-ENV-OPS-FO 03, *General Equipment Decontamination*

4-B29-ER-OPS-FO 14, *Field Data Management*

2-S47-ER-ADM-05 14, *Use of Field Logbooks and Forms*

The applicable manufacturer manuals are as follows:

ISCO, Inc , 1989, Instruction Manual Model 3210 Ultrasonic Open Channel Flow Meter, Rev E, ISCO, Inc , Nebraska, June

ISCO, Inc , 1989, *Instruction Manual Model 3220 Flow Meter*, Rev F, ISCO, Inc , Nebraska, December

ISCO, Inc , 1990, *Instruction Manual Model 3230 Flow Meter*, Rev C, ISCO, Inc , Nebraska, May

ISCO, Inc , 1994, *Instruction Manual Model 4230 Flow Meter*, Rev C, ISCO, Inc , Nebraska, June

ISCO, Inc , 1994, *FLOWLINK3 Tutorial*, Rev C, ISCO, Inc , Nebraska, July

ISCO, Inc , 1994, *Instruction Manual Model 4220 Flow Meter*, Rev C, ISCO, Inc , Nebraska, June

ISCO, Inc , 1984, *Instruction Manual Model 2700 Sampler*, ISCO, Inc , Nebraska, November

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ISCO, Inc , 1990, *Model 3700R/ 3740 Refrigerated Sampler Instruction Manual*, ISCO, Inc , Nebraska, June

ISCO, Inc , 1990, *Model 3700 Portable Sampler Instruction Manual*, Rev C, ISCO, Inc , Nebraska, October

ISCO, Inc , 1992, *Model 3710 Portable Sampler Instruction Manual*, Rev D, ISCO, Inc , Nebraska, March

ISCO, Inc , 1993, *Instruction Manual Model 6000 Sampler*, ISCO, Inc , Nebraska, December

ISCO, Inc , 1994, *3710 Portable Sampler Instruction Manual*, Rev K, ISCO, Inc , Nebraska, April

Hydrolab Corporation, 1994, *Recorder Water Quality Multiprobe Logger Operating Manual*, Hydrolab Corporation, Texas, May

Orion 1991 *Model 93-07 Nitrate Electrode Instruction Manual* Orion Research Incorporated Boston, MA

PHoenix Electrode Company 1997 *Nitrate Ion Selective Electrodes Instruction Manual* PHoenix Electrode Company Houston, TX

YSI, Inc , 1996, *6000UPG Multi-Parameter Water Quality Monitor Instruction Manual*, Yellow Springs Instruments Inc , Ohio

Geomation Measurement and Control Systems, Inc , 1992, *Geonet Operation Reference*, Geomation, Inc , Colorado, November

Other applicable resources are as follows:

Chow, V T , Maidment, D R , and L W Mays, 1988, *Applied Hydrology*, McGraw-Hill, Inc , New York, New York

Grant, D M , 1992, *ISCO Open Channel Flow Measurement Handbook*, Third Edition, ISCO Environmental Division, Lincoln, Nebraska

Kennedy, E J , 1984, *Techniques of Water Resource Investigations of the United States Geological Survey, Chapter A10 Discharge Ratings at Gaging Stations*, Book 3 Applications of Hydraulics, U S Department of the Interior, U S Geological Survey, U S Government Printing Office, Alexandria, Virginia

Rantz, S E , 1982, *Measurement and Computation of Streamflow Volume 1 Measurement of Stage and Discharge*, U S Geological Survey Water-Supply Paper 2175, U S Department of the Interior, U S Government Printing Office, Washington, D C

Rantz, S E , 1982 *Measurement and Computation of Streamflow Volume 2 Computation of Discharge,* U S Geological Survey Water-Supply Paper 2175, U S Department of the Interior, U S Government Printing Office, Washington, D C

Water Measurement Manual, Revised Reprint, 1984, U S Department of the Interior, Bureau of Reclamation, U S Government Printing Office, Denver, Colorado

Data are collected and managed and samples are collected, handled, and shipped in accordance with these procedures

2.3 Sample Handling and Custody Requirements

Custody and documentation protocols for field and laboratory work are described below, followed by a discussion of corrections to documentation

2.3.1 Field Sample Custody and Documentation

The information contained on the sample label, sample collection form, and the chain-of-custody record should match The purpose and description of the sample label, sample collection form, and the chain-of-custody record are discussed in the following sections

2.3.1.1 Sample Labeling and Identification

CASI labels sample bottle labels in accordance with RMRS procedure RMRS/OPS-PRO 069 *Containing, Preserving, Handling, and Shipping Soil and Water Samples* Sample labels or tags are completed and affixed to the appropriate sample containers These labels are secured with waterproof tape and include the sample identification number, the parameter(s) to be analyzed, the sampler's initials, and the preservative used At the time of sample collection, a member of the field team adds the date and time of sample collection

CASI assigns a unique number to each surface water sample in accordance with the RFETS Analytical Services Division (ASD) procedure ASD-003, *Identification System for Reports and Samples* The unique sample number is broken down into the following three parts

- The Report Identification Number (RIN)
- The Event Number
- The Bottle Number

The first part of the number is the RIN, which is assigned by the ASD The RIN is used by the ASD to track and file analytical data The RIN is a seven digit alphanumeric code starting with "00" for 2000 The RIN is followed by a dash "-" and then the event number The event number is a three digit code, starting with the "001" under the RIN, and is sequential Each sample location has a unique event number under the RIN Quality Control (QC) samples have unique event numbers to support a "blind" submittal to the analytical laboratories The event number is followed by a period

" " and then the sequential bottle number The bottle number is used to identify individual sample containers collected from the same location and the same event number

In addition to the sample numbering scheme above, additional information is collected with respect to each sample and recorded on the sample collection form (Figure 3) This additional information includes

- Sample number
- Location
- Date
- Time
- Composite (Y/N)
- QC code

QC codes include the following, as appropriate

- REAL Regular Sample
- DUP Duplicate Sample
- RNS Rinsate Sample

2.3.1.2 Chain-of-Custody Requirements

Chain-of-custody procedures and sample shipment follow the requirements stated in RMRS procedure RMRS/OPS-PRO 069, *Containing, Preserving, Handling, and Shipping Soil and Water Samples* (Section 3 5) CASI (ASD subcontractor) is responsible for completion of the COC (the COC includes information provided on the RMRS sample collection form [Figure 3]) The chain-of-custody record is employed as physical evidence of sample custody and control This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting A completed chain-of-custody record is required to accompany each shipment of samples and is included in the final data package submittal from laboratories

2.3.1.3 Sample Packaging and Shipping

Samples are packaged and shipped in accordance with RMRS procedure RMRS/OPS-PRO 069, *Containing, Preserving, Handling, and Shipping Soil and Water Samples* (Section 3 7) CASI (ASD subcontractor) is responsible for packaging and shipping of all surface water samples to the analytical laboratory selected by ASD

2.3.1.4 Field Logbook and Records

Field logbook(s) are maintained by the RMRS field team in accordance with 2-S47-ER-ADM-05 14, *Use of Field Logbooks and Forms* The logbook is an accounting of the accomplishment of scheduled activities, and notes problems or deviations from the governing plans and observations

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relating to the surface water field program The Automated Monitoring Project Manager maintains the logbook and files them as part of the document control procedure at the end of the field program

2.3.2 Laboratory Custody Procedures and Documentation

Laboratory custody procedures for analyses are provided in the ASD SOW Module GR01-B 3 *General Laboratory Requirements* Upon receipt at a laboratory, each sample shipment is inspected to assess the condition of the shipping cooler and the individual samples This inspection includes measuring the temperature of the cooler to document that the temperature of the samples is within the acceptable criteria (4 ± 2 °C) and verifying sample integrity The pH of the samples is measured, if preservation was required The enclosed chain-of-custody records are cross-referenced with all of the samples in the shipment These records are signed by the laboratory sample custodian, and copies provided to ASD, are placed in the final data packages The sample custodian may continue the chain-of-custody record process by assigning a unique laboratory number to each sample on receipt This number, if assigned, identifies the sample through all further handling It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, data reporting, and disposal as per ASD requirements

2.3.3 Corrections to and Deviations from Documentation

Logbook modification requirements are described in 2-S47-ER-ADM-05 14, *Use of Field Logbooks and Forms* (Section 5 1) For the logbooks, a single strikeout initialed and dated is required for all documentation changes The correct information should be entered in close proximity to the erroneous entry All deviations from the guiding documents are recorded in the field logbook(s) Any major deviations are documented according to the QAPD (RMRS, 1999b)

2.4 Analytical Methods Requirements

The laboratory QA program(s) and analytical methods are addressed below

2.4.1 Laboratory Quality Assurance Program

K-H ASD selects subcontractor laboratories Samples collected for the Automated Surface Water Monitoring Program are analyzed in accordance with standard EPA and/or nationally recognized analytical procedures The purpose of using standard procedures is to provide analytical data of known quality and consistency Subcontractor laboratories follow the QA requirements established in ASD SOW Module GR01-B 3 *General Laboratory Requirements*, Exhibit E, *Quality Assurance Requirements*

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2.4.2 Methods

The methods to be used for chemical analysis are discussed in Section 1 4 2 4 The holding time requirements for each analytical method are provided in the references for each module

2.5 Quality Control Requirements

Field, laboratory, and internal office QC are discussed below

2.5.1 Field Quality Control Samples

The following types of QC samples are collected in the field and shipped to the subcontractor laboratory,

- Field duplicates
- Equipment rinsate blanks
- Trip blanks

These types of QC samples are discussed below

2.5.1.1 Field Duplicates

Field duplicates are collected at a single sampling location, collected identically and consecutively over a minimum period of time This type of field duplicate measures the total system variability (field and laboratory variance), including the variability component resulting from the inherent heterogeneity of the surface water and sediment samples Field duplicates are collected at a minimum frequency of one per 20 samples per media Field duplicate samples provide a quantitative measurement of data quality for determining the degree of agreement among replicate measurements of a parameter

2.5.1.2 Equipment Rinsate Blanks

Equipment rinsate blanks are prepared and submitted for analysis at a minimum frequency of one per 20 surface water samples, and additionally whenever there are major changes in the sample collection procedures, sampling decontamination procedures, sampling equipment, or sample collection personnel Collection of equipment rinsate blanks are performed in accordance with instruction RF/RMRS-2000-015 Equipment rinsate blanks consist of pouring analyte-free distilled water into/through/over a decontaminated piece of sampling equipment (such as a carboy), and then dispensing it into prepared sample bottles Equipment rinsate samples are examined to determine if positive detections of contaminants are attributable to cross contamination in the field

2.5.1.3 Trip Blanks

A trip blank consists of analyte-free water provided by a laboratory or deionized/distilled water used by sampling personnel for equipment decontamination prior to decontamination It accompanies the samples from collection through shipment This QC sample serves as a check for cross-contamination of VOCs Since VOCs are not collected as part of the Automated Surface Water Sampling Program trip blanks will not be collected

2.5.2 Laboratory Quality Control Samples

The designated analytical laboratories will follow all laboratory QC checks, as defined in the analytical methods listed in Section 1 4 2 4 Guidelines for laboratory QC samples are in accordance with the ASD Modules, RC01-B 3, RC02-B 1, SS05-C and SS06-B 3

2.5.2.1 Internal Quality Control Samples

Quality control (QC) data are used to determine precision and accuracy, and to demonstrate the absence of interferences and/or contamination of glassware and reagents Results of the QC analyses are included in the QC package, and QC samples may consist of laboratory blanks, laboratory duplicates, MS/MSDs, and/or LCS/LCSDs, whichever are applicable, and any other method-required QC samples

Laboratory method blanks (or preparation blanks) are analyzed to assess possible contamination so that corrective measures may be taken, if necessary Laboratory duplicate samples are aliquots of a single sample that are split on arrival at the laboratory, or upon analysis Results obtained for two replicates that are split in a controlled laboratory environment are used to assess laboratory precision of the analysis MS/MSD and LCS/LCSD analyses may be used to determine both precision and accuracy

2.5.2.2 Laboratory Quality Control Checks

A calibration standard is prepared in the laboratory by dissolving a known amount of a standardized compound in an appropriate matrix or dilution The final concentration calculated from the known quantities is the true value of the standard Where applicable, reference standard solutions are traceable to either EPA, or the National Institute of Standards and Technology The analysis results obtained from these standards are used to prepare a standard curve, and thereby quantify the compounds found in the environmental samples

The number of calibration standards is prescribed by each individual analytical method procedure referenced in each ASD Module

2 5.3 Internal Quality Control Checks

Internal QC checks are conducted throughout the project to evaluate the performance of the project team during data generation All program deliverables receive technical and QA reviews prior to being issued Completed review forms are maintained in the program files

Corrective action of any self identified deficiencies is the responsibility of the Project Manager, with assistance from the QA staff, if necessary

2.6 Equipment Maintenance Procedures

All laboratory equipment is maintained in accordance with manufacturers' instructions and the laboratory's SOPs as per the ASD *General Laboratory Requirements* (Module GR01-B 3)

2.7 Instrument Calibration Procedures And Frequency

Calibration and measuring and testing equipment (M&TE) of field and laboratory instruments is addressed in the following subsections

2.7.1 Field Equipment

Field instruments and equipment used to gather, generate, or measure water pH, temperature, conductivity, turbidity and nitrate measurements are listed in Table 4 The field instruments are calibrated following manufacturer's instructions and recommended frequencies

2.7.2 Laboratory Equipment

Calibration of laboratory equipment is based on M&TE requirements established in the ASD SOW *General Laboratory Requirements* (Module GR01-B 3), Exhibit E (Quality Assurance Requirements), Section 5 (M&TE)

2.8 Acceptance Requirements for Supplies

Items or activities that require inspections and/or acceptance testing are specified in work controlling documentation (e g , work plans, standard operating procedures, and instructions) Acceptance criteria is clearly defined and is based on the manufacturer's specification unless otherwise stated M&TE is accepted or rejected based on calibration information and pre-established tolerances, including unique identification, traceability, accuracy, resolution, measurement ranges, and acceptance/rejection criteria Calibration standards are traceable to nationally recognized or industry standards Prior to acceptance, all supplies and consumables are inspected by RMRS to ensure that they are in satisfactory condition and free of obvious defects

2.9 Nondirect Measurement Data Acquisition Requirements

Nondirect measurement data include information from preliminary surface water sampling location visits, literature searches, and interviews The acceptance criteria for such data include a review by someone other than the author Any measurement data included in information from the above sources determines further action at the Site only to the extent that those data can be verified

2.10 Data Management

Sample results and QC data are delivered by K-H ASD to RMRS as an electronic data deliverable (EDD) in addition to a hard copy deliverable Requirements for the EDD are established in the ASD SOW module GR02-D *Electronic Data Deliverables* The purpose of the EDD module is to provide a data format that enables efficient return of quality data in support of the Site mission In addition, the EDD requirements are provided to accomplish the goal of receiving quality electronic data for input into the RMRS Soil and Water Database (SWD) Detailed data management protocols and procedures for SWD are discussed in RF/RMRS-98-203, *SWD As-Built Detailed Design*

3.0 ASSESSMENT AND OVERSIGHT

Quality improvement is realized through use of a systematic means of identifying, tracking, and correcting problems (deficiencies, non-conformances, issues, etc) Any project personnel may identify problems at any time, through formal documentation of issues as stated in 3-X31-CAP-001, *Corrective Action Process* and 1-65-ADM-15 01, *Control of Nonconforming Items* Management and independent assessments and surveillances are used to identify, track, and correct issues (Sections 3 1 1, 3 1 2 and 3 1 3) The extent of causal analysis and corrective action(s) are commensurate with the significance of the failure or problem "Lessons Learned" are communicated to staff by management where appropriate

3.1 Assessments and Response Actions

Assessments, surveillances and corresponding response actions are discussed below

3.1.1 Management Assessments

RMRS management will evaluate the Automated Surface Water Monitoring performance biannually to determine the effectiveness of the Quality Assurance Plan and overall RMRS organizational performance Management assessments are documented through annual reports, periodic status reports, internal memoranda, or other suitable reporting means, and are performed according to RMRS-QA-09 01, *Management Assessments*

3.1 2 Independent Assessments

Independent assessments, in contrast to management assessments, are performed by personnel who are not directly responsible for the work being performed Independent assessments are performed according to RMRS-QA-10 01, *Independent Assessments*

Independent assessments shall

- be based on the RMRS QAPD (RMRS, 1999b), procedures, and other controlling documents as necessary,
- evaluate the performance of work beyond the mere review of documents and records (i e , relative to technical specifications and project-specific data quality objectives and associated management decisions),
- act as management advisory functions, and,
- view the organization being assessed as the "customer" of the assessment results, and strive to produce useful feedback on RMRS assets and liabilities with respect to the RMRS mission and performance objectives

A schedule of independent assessments planned for the Automated Surface Water Monitoring Program is determined by the RMRS Independent Assessment Program

3.1.3 Surveillances

Surveillances are performed by the RMRS Surface Water QA Engineer to ensure quality assurance compliance, implementation, and program effectiveness Surveillances are conducted in accordance to RMRS-QA-10 02 *Conduct of Surveillances* Surveillances are planned on an annual basis and will cover (but are not limited to) the following topics

- Procedural compliance
- Calibration data
- Records Management
- Document Control
- Personnel training
- Data Quality Assessments
- Unscheduled maintenance activities
- Corrective action activities
- Any unresolved problem
- Assessment of data deficiencies
- Any significant QA/QC problems not included above

Surveillance reports are provided to the responsible manager with copies to the Facility Manager and the Quality Assurance Manager Deficiencies will be reported in accordance with 1-65-ADM-15 01, *Control of Nonconforming Items*

4 0 DATA VALIDATION AND USABILITY

Laboratory results are reviewed for compliance with the automated surface water program monitoring objectives Data validation/verification and data quality assessments are discussed in Sections 4 1 and 4 2, respectively

4.1 Verification and Validation

Data validation are performed on approximately 25% of all Sitewide analytical data generated through the K-H ASD, the remaining 75% are only verified TechLaw, Inc (K-H ASD subcontractor) performs verification and validation of the final data packages Data verification and validation are the responsibility of K-H ASD and are performed in accordance with ASD procedure DA-GRO1-v1 *General Guidelines for Data Verification and Validation* The determination of which data packages are validated is typically done in a random manner by K-H ASD It is also the responsibility of K-H ASD to inform the Project Manager and the Sample Coordinator if analytical issues are discovered during the validation process that result in the data packages(s) being qualified in any way

4.2 Data Quality Assessment

4.2.1 Data Evaluation

After data validation and verification is performed by TechLaw Inc , the analytical data are electronically transmitted to SWD for data user access Analytical data collected in support of the automated surface water program are evaluated using the guidance established in the RMRS procedure RF/RMRS-98-200, *Evaluation of Data for Usability in Final Reports* This procedure establishes the guidelines for evaluating the analytical data with respect to the PARCC parameters The data are evaluated for the PARCC parameters as discussed in Section 1 4 2 2 Data quality assessments are performed for the automated surface water program in the Quarterly RFCA Monitoring Reports as well for POC and POE Source Evaluation Reports

4.2.2 Soil Water Database

Analytical data are maintained in the RMRS SWD, an Oracle™ Structured Query Language (SQL) database SQL is a language used to retrieve, update and manage data SWD is a relational database designed for the management, analysis, and reporting of soil and water analytical data The SWD Detailed Design document (RF/RMRS-98-203) provides the guidance for the Rocky Flats Soil and Water Database

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5.0 REFERENCES

EPA, 1994, Guidance for the Data Quality Objectives Process, EPA QA/G-4 September

EPA, 1997, EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations QA/R-5 Draft Final October

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, General Laboratory Requirements, Module GR01-B 3, March 18, 1999

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, Electronic Data Deliverables, Module GR02-D, August 13, 1997

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, Isotopic Determinations by Alpha Spectrometry, Module RC01-B 3, April 24, 1998

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, Tritium Analysis by Liquid Scintillation Counting, Module RC02-B 1, May 4, 1998

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, Inorganic Metals, Module SS05-C, January 5, 1999

Kaiser-Hill Analytical Services Division, Statement of Work for Analytical Measurements, Water Quality Parameters, Module SS06-B 3, March 9, 1999

Kaiser-Hill Analytical Services Division, Statement of Work for Data Assessment Services, Module AS03-A 1, September 10, 1998

Kaiser-Hill Analytical Services Division, General Guidelines for Verification and Validation, Module DA-GR01-v1, December 3, 1997

Kaiser-Hill Analytical Services Division, Identification System for Reports and Samples, ASD-003, Version 1, March 22, 1999

Kaiser-Hill Company, L L C , 1999a, Rocky Flats Environmental Technology Site Integrated Monitoring Plan FY 2000 September

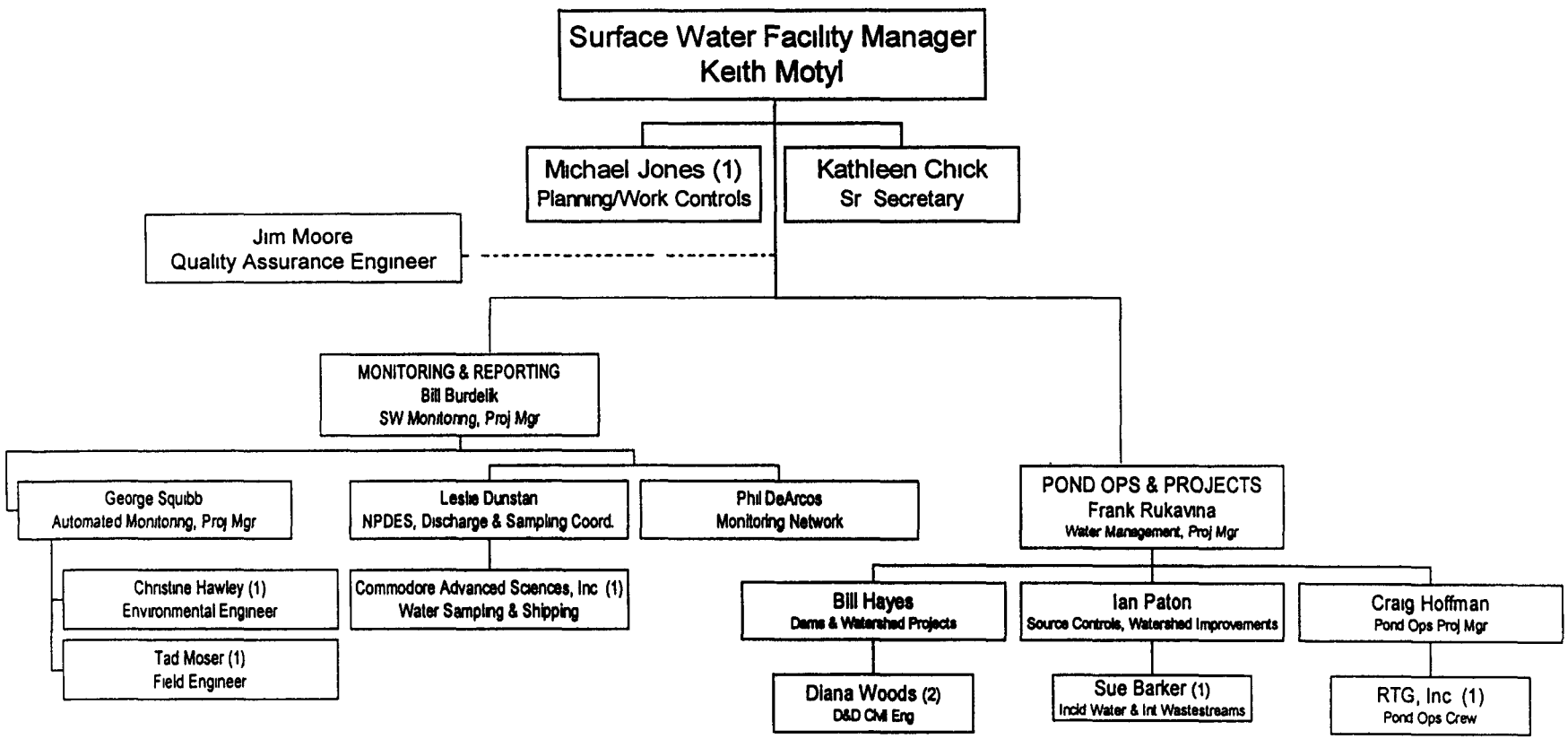
Kaiser-Hill Company, L L C , 1999b, Rocky Flats Environmental Technology Site Integrated Monitoring Plan Background Document FY 2000 September

RFCA, 1996, Final Rocky Flats Cleanup Agreement, U S Department of Energy, Colorado Department of Health and Environment, U S Environmental Protection Agency July

RMRS, 1999a, Automated Surface-Water Monitoring Program Work Plan, RF/RMRS 99-347, July 30, 1999

RMRS, 1999b, RMRS Quality Assurance Program Description, RMRS-QAPD-001, Rev 3, September 13, 1999

Figure 1
RMRS Surface Water, Program Organization Chart
Rocky Flats Environmental Technology Site, Golden, Colorado



Notes
(1) Subcontractor
(2) Matrixed

Revised February 2000

Figure 3

Sample Collection Form

Project Name RFCA Contractor RMRS Sampler C M Hawley ☐

J S Squibb ☐

Other _____

Location _____

Sample Number	Date	Time	Composite Y / N	QC Type
_____	_____	_____		Real ☐
_____				Duplicate ☐

Method ISCO 2700 Auto Sampler ☐ RNS ☐

ISCO 3700 Auto Sampler ☐

Comments _____

ANALYSES	LINE ITEM CODE	BOTTLE	PRESERATIVE
Rad Screen	OS01A002	125 ml Poly	NONE
Pu Am U	RC01B002	4L Cube	HNO3
Pu Am	RC01B013	4L Cube	HNO3
	RC01B008		
Tritium	RC02B001	250ml AG	NONE
Dissolved Cd Ag	SS05C037	1L Poly	HNO3/4C
Be Cr	SS05C038	1L Poly	HNO3/4C
Hardness	SS06B019	1L Poly	HNO3/4C
TSS	SS06B035	1L Poly	4C
Metals(CLP)	SS05C001	1L Poly	HNO3/4C
NO3/NO2	SS06B022	500ml Poly	H2SO4/4C

RELINQUISHED BY _____ DATE _____ TIME _____

RECEIVED BY _____ DATE _____ VOLUME (LITERS) _____

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TABLE 1 - CROSSWALK BETWEEN EPA QA/R-5 AND DOE ORDER 414 1

QAPP Elements	EPA QA/R-5 Elements	DOE Order 414.1 Elements: 1 Program	2 Personnel Training and Qualification	3 Quality Improvement	4 Documents and Records	5 Work Processes	6 Design	7 Procurement	8 Inspection and Acceptance Testing	9 Management Assessment	10 Independent Assessment
Project Management	A1 Title and Approval Sheet				X						
	A2 Table of Contents				X						
	A3 Distribution List				X						
	A4 Project/Task Organization	X					X				
	A5 Problem Definition/Background	X					X				
	A6 Project/Task Description	X					X				
	A7 Quality Objectives and Criteria for Measurement Data						X				
	A8 Special Training Requirements		X			X					
	A9 Documentation and Records	X			X						
Measurement Data Acquisition	B1 Sampling Process and Design					X					
	B2 Sampling Methods Requirements					X					
	B3 Sample Handling and Custody Requirements					X					
	B4 Analytical Methods Requirements					X					
	B5 Quality Control Requirements								X		
	B6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements								X		
	B7 Instrument Calibration and Frequency								X		
	B8 Inspection/Acceptance Requirements for Supplies and Consumables							X	X		
	B9 Data Acquisition Requirements								X		
	B10 Data Management								X		
Assessment Oversight	C1 Assessments and Response Actions			X						X	X
	C2 Reports to Management			X						X	X
Data Validation and Usability	D1 Data Review, Validation, and Verification Requirements								X		
	D2 Validation and Verification Methods								X		
	D3 Reconciliation with User Requirements					X			X		

X - Denotes primary corresponding requirement in EPA QA/R-5 basic requirements

TABLE 2 - AUTOMATED SURFACE WATER SAMPLING AND ANALYSIS

Analytical Parameter(s)	Analytical Method	ASD Module	ASD Line Item Code
Pu, Am, U	Alpha Spectrometry	RC01-B 3	RC01B002
Pu, Am	Alpha Spectrometry	RC01-B 3	RC01B013 and RC01B008
Tritium	Liquid Scintillation Counting	RC02-B 1	RC02B001
Metals	CLP-SOW-Total	SS05-C	SS05C001
Cd, Ag	EPA-600-Dissolved	SS05-C	SS05C037
Be, Cr	EPA-600-Total Recoverable	SS05-C	SS05C038
Hardness (as $CaCO_3$)	EPA 130 2 or SM 2340C	SS06-B 3	SS06B019
TSS	EPA 160 2 or SM2540D	SS06-B 3	SS06B035

TABLE 3 - SURFACE WATER CORE TRAINING MATRIX

Surface Water Organizational Training Requirements	Facility Manager	Keith Motyl	Environmental Scientist	Leslie Dunstan	William Burdelik	Sue Barker	Mechanical Engineer	William Hayes	Environmental Engineer	Craig Hoffman	Michael Jones	Ian Paton	Christine Hawley	George Squibb	Tad Moser	Principal Specialist	Frank Rukavain	Comliance Specialist	Phil DeArcos	Pond Operations Techs	Robert Hamling	Phil Flynn	Sr Secretary	Kathleen Chick	COMMENTS
Computer Security Unclassifed User	X		X				X		X							X		X		X			X		
Confined Space Entry																				X					
Fall Protection Safety Awareness																				X					
General Employee Rad Training (GERT)	X		X				X		X							X		X		X			X		
GERT/Rad Wkr Refresher Brochure	X		X				X		X							X		X		X			X		
Hazardous Waste Ops 24 Hour	X		X				X		X							X		X		X			X		
Hazardous Waste Ops Refresher 8 hr	X		X				X		X							X		X		X			X		
Hazardous Waste Ops Supervisor	X																								
Hearing Conservation																				X					
Industrial Truck Safety																				X					
Lockout / Tagout Classroom																				X					
Pressure Safety Awareness																				X					

Surface Water Manager Approval

2/15/00

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TABLE 4 - FIELD EQUIPMENT AND SUPPLIES

Item	Unit	Quantity
4 wheel drive utility vehicle	Each	1
Two-way radio	Each	2
Lap-top PC with Flolink3 software, interrogator cable, and case	Each	1
Field log book	Each	1
15 liter carboy with lid	Each	As needed
22 liter carboy with lid	Each	As needed
Replacement ISCO Flowmeter plotter paper	Roll	As needed
Replacement ISCO Flowmeter bubble line tubing	Each	As needed
Replacement ISCO Sampler pump tubing	Each	As needed
Replacement ISCO Desiccant	Each	As needed
Replacement ISCO miscellaneous spare parts	Each	As needed
ICSO Model 674 Rain Gauge (or equivalent) with associated cables	Each	10
ISCO Model 4210 Flowmeter with associated cables	Each	3
ISCO Model 4220 Flowmeter with associated cables	Each	9
ISCO Model 4230 Flowmeter with associated cables	Each	26
ISCO Model 1640 Liquid Level Sampler Actuator with cables	Each	4
ISCO Model 2700 Sampler with associated cables	Each	7
ISCO Model 3700 Sampler with associated cables	Each	6
ISCO Model 3700R Sampler with associated cables	Each	10
ISCO Model 3710 Sampler with associated cables	Each	18
Geomation Model 2370 Measurement and Control Unit	Each	28
Geomation Model 2380 Measurement and Control Unit	Each	12
Geomation software	Each	1
DC solar panel with wiring and charge regulator	Each	As needed
12-volt sealed, maintenance-free, gel-cell batteries	Each	As needed
Sampler/Battery weather-tight enclosures	Each	As needed
H-Flumes – various sizes	Each	As needed
Parshall flumes – various sizes	Each	As needed
Weirs – various shapes and sizes	Each	As needed
Sandbags	Each	As needed
Tarps	Each	As needed
Weather resistant, environmental tarp material	Each	As needed
Tape measure	Each	1
4' level	Each	1
Torpedo level	Each	1
Pressurizing water sprayer	Each	1
Hand held multimeter	Each	1
Tape – various kinds	Roll	As needed
Transit, tripod and Philadelphia rod	Each	As needed
Hard hat	Each	As needed
Safety shoes	Each	As needed
Safety glasses	Each	As needed
Gloves	Each	As needed
Safety vest	Each	As needed
Coveralls/Jacket	Each	As needed
Sunscreen	Each	As needed
Watch with stop watch	Each	As needed
Eyewash station	Each	1
Distilled water bottle	Each	As needed
Nitrate standard 1 mg/L	Each	As needed

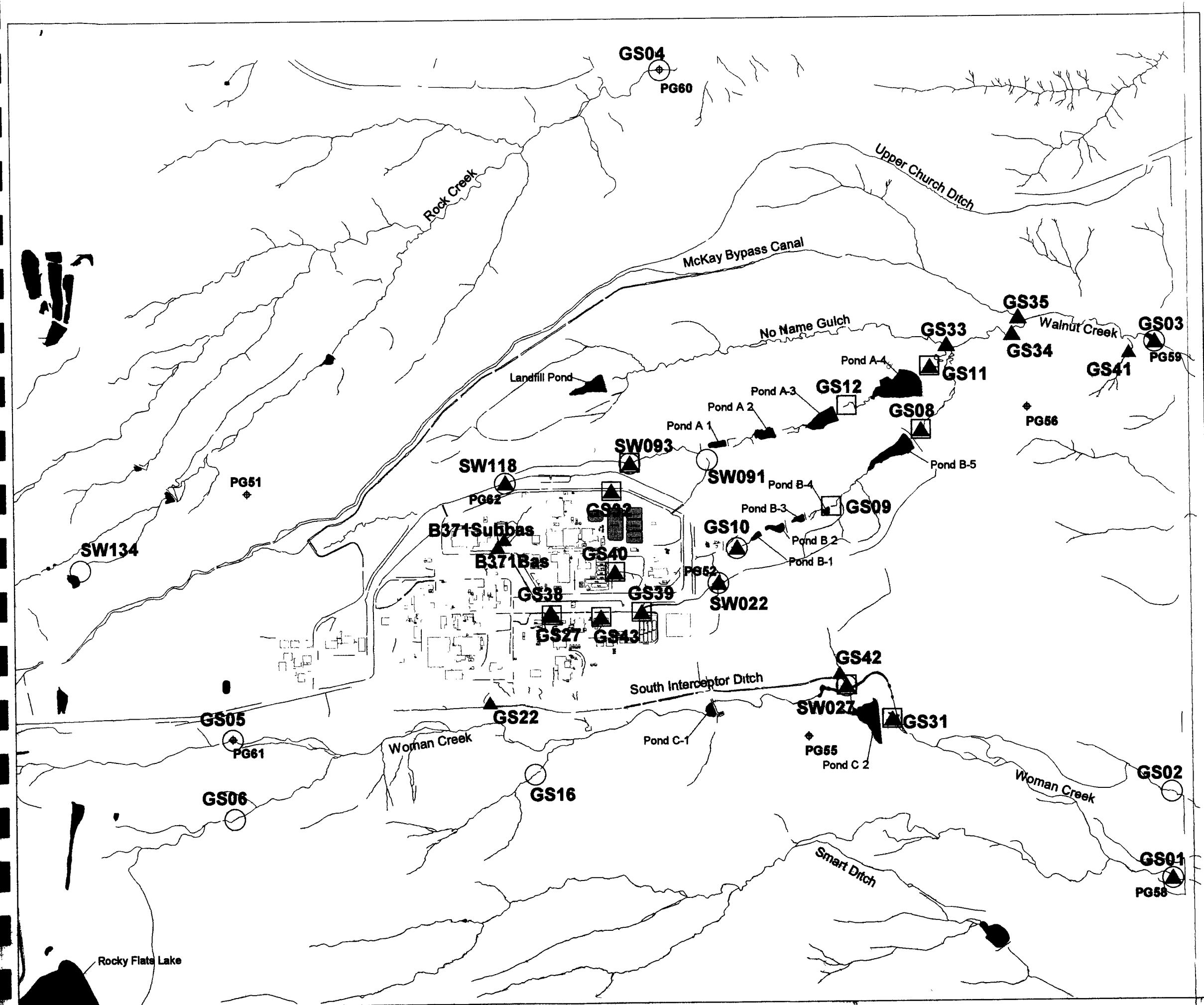
TABLE 4 - FIELD EQUIPMENT AND SUPPLIES

Item	Unit	Quantity
Nitrate standard 100 mg/L	Each	As needed
Turbidity standard 100 NTU	Each	As needed
pH standard 7 0	Each	As needed
pH standard 10 0	Each	As needed
pH indicator strips	Each	As needed
Conductivity standard 1000uS	Each	As needed
Soft bristle brushes	Each	As needed
Q-tips single tipped applicators	Each	As needed
Kimwipes	Each	As needed
Metal baking pans	Each	As needed
Electric oven	Each	1
Refrigerator	Each	1
12 volt DC power supply	Each	1
PC with EcoWatch software, 2 0 MB floppy disks	Each	1
YSI Multi-Parameter Water Quality Monitor (Model 6000 UPG)	Each	6
Miscellaneous glass beakers, flasks, pipettes, and graduated cylinders	Each	As needed
Pipette bulbs	Each	As needed
Plastic graduated cylinders – various sizes	Each	As needed
O-ring sealant	Each	As needed
Hand tools (shovels, pick-ax, sledgehammer, etc)	Each	As needed
Mechanic tool set (Wrenches, pliers, screwdrivers, etc)	Each	As needed
Power tools (Saws, cordless drills etc)	Each	As needed
Extension cords	Each	As needed
PVC piping – various diameters	Each	As needed
PVC pipe fittings – assorted variety	Each	As needed
Galvanized piping – various diameters	Each	As needed
Galvanized pipe fittings – assorted variety	Each	As needed
Assorted tie-wraps and hose clamps	Each	As needed
Assorted fasteners (screws, bolts, nails, etc)	Each	As needed
Assorted wood (2x4, 4x4, pallets, etc)	Each	As needed
Metal T-type fence posts	Each	As needed
Wire mesh screen	Each	As needed
Assorted sealants (caulk, putty, glue, etc)	Each	As needed

40/40

Figure 2

Automated Surface-Water Monitoring Locations and Precipitation Gages



EXPLANATION

- Precipitation Gages

Monitoring Location Objective

- ▲ Ad Hoc Monitoring Location
- □ Performance Monitoring Locations
- ▲ Source Location Monitoring
- ○ New Source Detection Monitoring Location
- □ IDLH Monitoring Location**
- ○ Buffer Zone Hydrologic Monitoring Locations
- ▲ Point of Compliance
- ▲ Point of Evaluation

Standard Map Features

- Buildings and other structures
- Streams ditches or other drainage features
- Lakes and ponds
- Solar Evaporation Ponds
- 20 Foot Contours

NOTE

The monitoring objective( ) performed at each location are detailed in the Surface-Water Section of the Site Integrated Monitoring Plan

** IDLH (Immediate Danger to Life & Health) refers to the monitoring objective for safe operation of the Site detention ponds

N

1000 0 1000 2000 Feet